Translation

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference	FOR FURTHER ACTION	See Form PCT/IPEA/416
HP 500/03 PCT		
International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/DE2004/001641	23.07.2004	25.07.2003
International Patent Classification (IPC) or national classification and IPC		
H01M8/24		
Applicant		
WEBASTO AG		

1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 11 sheets, including this cover sheet.
3. This report is also accompanied by ANNEXES, comprising:
   a. ☐ *(sent to the applicant and to the International Bureau)* a total of _____ sheets, as follows:
      ☐ sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).
      ☐ sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.
   b. ☐ *(sent to the International Bureau only)* a total of (indicate type and number of electronic carrier(s))
      _____ , containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).
4. This report contains indications relating to the following items:

☒	Box No. I	Basis of the report
☐	Box No. II	Priority
☐	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
☒	Box No. IV	Lack of unity of invention
☒	Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
☐	Box No. VI	Certain documents cited
☒	Box No. VII	Certain defects in the international application
☒	Box No. VIII	Certain observations on the international application

Date of submission of the demand	Date of completion of this report
Name and mailing address of the IPEA/EP Facsimile No.	Authorized officer Telephone No.

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.
PCT/DE2004/001641

Box No. I Basis of the report

1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ This report is based on translations from the original language into the following language _____, which is the language of a translation furnished for the purposes of:

☐ international search (Rule 12.3 and 23.1(b))

☐ publication of the international application (Rule 12.4)

☐ international preliminary examination (Rule 55.2 and/or 55.3)

2. With regard to the **elements** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:

☐ the international application as originally filed/furnished

☒ the description:

pages 1-20 as originally filed/furnished

pages* _____ received by this Authority on _____

pages* _____ received by this Authority on _____

☒ the claims:

nos. 1-22 as originally filed/furnished

nos.* _____ as amended (together with any statement) under Article 19

nos.* _____ received by this Authority on _____

nos.* _____ received by this Authority on _____

☒ the drawings:

sheets 1/4-4/4 as originally filed/furnished

sheets* _____ received by this Authority on _____

sheets* _____ received by this Authority on _____

☐ a sequence listing and/or any related table(s) – see Supplemental Box Relating to Sequence Listing.

3. ☐ The amendments have resulted in the cancellation of:

☐ the description, pages _____

☐ the claims, nos. _____

☐ the drawings, sheets/figs _____

☐ the sequence listing *(specify)*: _____

☐ any table(s) related to sequence listing *(specify)*: _____

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

☐ the description, pages _____

☐ the claims, nos. _____

☐ the drawings, sheets/figs _____

☐ the sequence listing *(specify)*: _____

☐ any table(s) related to sequence listing *(specify)*: _____

* *If item 4 applies, some or all of those sheets may be marked "superseded."*

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.
PCT/DE2004/001641

Box No. IV Lack of unity of invention

1. ☐ In response to the invitation to restrict or pay additional fees the applicant has:

   ☐ restricted the claims.

   ☐ paid additional fees.

   ☐ paid additional fees under protest.

   ☐ neither restricted the claims nor paid additional fees.

2. ☒ This Authority found that the requirement of unity of invention is not complied with and chose, according to Rule 68.1, not to invite the applicant to restrict or pay additional fees.

3. This Authority considers that the requirement of unity of invention in accordance with Rules 13.1, 13.2 and 13.3 is:

   ☐ complied with.

   ☒ not complied with for the following reasons:

Claims 1, 20 and 21 are not linked by a common inventive concept.

These claims add the following elements to the combination of technical elements known from D1:

claim 1: "process steps for producing a fuel cell stack, such as "stacking", "joining", etc."

Claim 20: "electric testing device"

Claim 21: "plurality of movable, gas-tight processing chambers".

These added elements are not the same or equivalent, since they have different technical effects. The claims thus lack unity of invention.

4. Consequently, this report has been established in respect of the following parts of the international application:

   ☒ all parts.

   ☐ the parts relating to claims Nos. _____

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.
PCT/DE2004/001641

Box No. V **Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

1. Statement

Novelty (N)	Claims	1-14, 20-22	YES
	Claims	15-19	NO
Inventive step (IS)	Claims	1-14, 20-22	YES
	Claims		NO
Industrial applicability (IA)	Claims	1-22	YES
	Claims		NO

2. Citations and explanations (Rule 70.7)

1. This report makes reference to the following documents cited in the search report; the same numbering will be used throughout the procedure:

D1: PATENT ABSTRACTS OF JAPAN, Vol. 1999, No. 04, 30 April 1999 (1999-04-30) & JP 11 007975 A (YOYU TANSANENGATA NENRYO DENCHI HATSUDEN SYST GIJUTSU KENKYU KUMIAI), 12 January 1999 (1999-01-12)

D2: WO 02/09216 A2 (BALLARD POWER SYSTEMS INC; BAILEY, ROSS, W., J.; HILL GRAHAM, E.), 31 January 2002 (2002-01-31)

D3: PATENT ABSTRACTS OF JAPAN, Vol. 008, No. 268 (E-283), 7 December 1984 (1984-12-07) & JP 59 138075 A (HITACHI SEISAKUSHO KK), 8 August 1984 (1984-08-08)

D4: EP-A-0 642 185 (MITSUBISHI JUKOGYO KABUSHIKI KAISHA), 8 March 1995 (1995-03-08)

D5: US-A-4 430 179 (FORD ET AL), 7 February 1984 (1984-02-07)

2. Prior art and novelty (PCT Article 33(2))

2.1 D1 describes a device for maintaining the

Box No. V — Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

fastening pressure upon a fuel cell. The device comprises a heating system (9A, 9B) which surrounds the fuel cell (9), and a bracing spring (14) which applies a pressure to the fuel cell via a plate (11) and plate (9B). The other end of the spring is joined to a plate (10). Bellows (13) to which gas can be applied via lines (15 and 16) are arranged between plate (10) and plate (11). The spring (14) contains pressure sensors (17) connected to the control system (21) by a line (20A). The control system (21) controls by means of valve (22) how much pressure is applied to the bellows. The goal is to maintain the force applied to the fuel cell stack always constant, at the level of a reference force, thus forming a regulated system.

Since the device described in D1 comprises a heating system and a force regulation system, it is suitable for carrying out the process for producing a fuel cell stack as per claim 1 of the present application. The independent device claim 15 is thus not novel.

The device is also considered suitable for transmitting the regulated force component to the fuel cell stack via a tension rod. Moreover, it shows a processing chamber (1) into which N_2 can be led. Feed pipes for the fuel cell are implicit. Pipe (26) evacuates the N_2 gas to a certain extent. Claims 16-19 thus lack novelty over D1. A process for producing a fuel cell stack is not described,

nor are electric testing devices or movable processing chambers mentioned.

2.2 D2 describes a device and process for testing a SOFC stack (abstract). For that purpose, a regulated force is applied to the stack and its geometrical modification is sensed, for which both pressure and elongation sensors are necessary (page 6, line 29 – page 27, line 22). Heating of the stack or a process for producing the same are not described.

2.3 D3 describes a fuel cell with melted carbonate in which pressure upon the cell stack is also maintained by a regulated system substantially comprising a pressure sensor (8), a lifting system (10) and a control system (12). Heating is not provided, nor is a process for producing a fuel cell stack described.

2.4 D4 describes the manufacture of a SOFC stack. According to column 3, line 54 to column 4, line 1, and column 6, lines 1–9, a stack is produced from joining layers (25a, b, c) and electrolyte layers (22) provided with electrodes, to which a sealing material has been applied, by joining them under pressure and heat to form a unit. D5 does not mention the use of a regulated force for that purpose, nor does it describe a device.

2.5 D5 describes a process for applying a fastening pressure to a fuel cell stack. A stack is first

formed and then pressure is applied thereto by means of a plurality of bracing devices at various points of an end plate of the stack. The bracing devices are than blocked and the pressure applied from the outside is removed. The pressure upon the stack is maintained by blocking the bracing devices (claim 1). The pressure applied from the outside to the bracing devices is regulated (column 5, lines 19-23). Heating of the cells is not mentioned.

3. Inventive step (PCT Article 33(3))

3.1 D4 is regarded as the prior art closest to the process claim 1. The difference from D4 is that no regulated force component is used in D4 when compressing the fuel cell stack.

3.2 The objective problem is considered to be that of devising a process for producing a fuel cell stack in which the stack is joined under heat and pressure and spoilage rate during joining is reduced. Precisely the use of heat and the associated changes in geometrical dimensions can lead, on the one hand, to an accumulation of stresses and, on the other hand, to relaxation effects and the associated untightness.

3.3 This problem is solved, in the process as per claim 1, in that the force that acts upon the cell stack during the joining process is regulated, i.e. constantly compared with a set value and

readjusted whenever required.

This solution is not suggested by D1-D4. A combination of D4 and D5 would lead to the subject matter of claim 1. However, this combination does not appear to be obvious, since D5, unlike D4, does not mention SOFCs and, in addition, does not describe the advantages of force regulation.

Claim 1 thus appears to be inventive.

3.4 Likewise, the devices as per claims 20 and 21 appear to be inventive, since none of the documents D1-D5 mentions or suggests electric testing devices or a plurality of movable processing chambers.

3.5 The objective problem addressed by claim 20 can be considered to be that of providing a device for joining a fuel cell stack in which stack spoilage during the joining process is reduced. Since the electric parameters of the stack are also sensed during joining, deviations from the set value can be counteracted during the joining process by modifying the joining parameters.

3.6 The objective problem addressed by claim 21 can be considered to be that of providing an installation for automating the stacking and joining process.

3.7 Observation: claims 1, 20 and 21 are not linked by a common inventive concept (see BOX IV).

Box No. V **Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

4. Industrial applicability (PCT Article 33(4))

Claims 1-22 meet the requirements of PCT Article 33(4) for industrial applicability, since the technical subject matter of the present application can be industrially produced or used, in a technical sense.

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.
PCT/DE2004/001641

Box No. VII Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

The present application does not meet the requirements of PCT Rule 5.1(a)(ii) because it does not mention and briefly discuss the essential contents of the relevant prior art, such as D1 and D4.

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.
PCT/DE2004/001641

Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

The restriction of the invention on page 18, lines 20-22, is unclear and leads to a vague definition of the scope of the subject matter for which protection is sought, because it is not possible to determine which combination of technical elements is part of the invention and which combination is not part of the invention. This paragraph thus fails to meet the requirements of PCT Article 6 (see also PCT Gazette, Section IV, Chapter III-4.3a).